

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): NUTRI-GROW® SULFONE with N-RICHED TECHNOLOGY
CHEMICAL NAME/CLASS: Inorganic Salt Mixture
PRODUCT NUMBER: 5-0-15
PRODUCT USE: Fertilizer
FACTORY FORMULA: 01120
SUPPLIER/MANUFACTURER'S NAME: VERDESIAN LIFE SCIENCES, U.S., LLC
ADDRESS: 12222 Ave 352
Visalia, CA 93291
EMERGENCY PHONE: CHEMTREC: 1-800-424-9300
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DATE OF PREPARATION: May 4, 2011
DATE UPDATED: December 30, 2013

2. COMPOSITION and INFORMATION ON INGREDIENTS

| CHEMICAL NAME | %w/w | EXPOSURE LIMITS IN AIR | | | | | |
|--|---------|---|---------------------------|--------------------------|---------------------------|---------------------------|------------|
| | | ACGIH | | OSHA | | IDLH mg/m ³ | CAS # |
| | | TLV mg/m ³ | STEL mg/m ³ | PEL mg/m ³ | STEL mg/m ³ | | |
| Ferrous Sulfate | < 5 | NE | NE | NE | NE | NE | 7782-63-0 |
| Manganese Sulfate | <5 | NE | NE | NE | NE | NE | 10034-96-5 |
| Zinc Sulfate | <5 | NE | NE | NE | NE | NE | 7733-02-0 |
| Urea | >10 | NE | NE | NE | NE | NE | 57-13-6 |
| Dimethyl Sulfone | > 10 | NE | NE | NE | NE | NE | 67-71-0 |
| Proprietary Potassium Compounds | > 10 | NE | NE | NE | NE | NE | 13977-65-6 |
| Proprietary Ammonium Compounds | > 10 | NE | NE | NE | NE | NE | 13446-12-3 |
| Organic Acid Salt | > 1 | NE | NE | NE | NE | NE | Prop. |
| Other components. Each of the other components are present in less than 1 percent concentration (or 0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens). | Balance | None of the other components contribute significant, additional, hazards at the concentrations present in this product. | | | | | |

NE = Not Established

C = Ceiling Limit

See Section 16 for Definitions of Terms Used

NOTE (1): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1993 format.

NOTE (2): Though information in this document is proprietary, ALL pertinent hazard information is provided in the following MSDS sections, per the requirements of the U.S. Federal Hazard Communication Standard (29 CFR 1910.1200) and the Canadian Workplace Hazardous Materials Identification System. This information will be released when the conditions of the Standard are met.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This is a yellow dry mixture of salts. This product presents a slight health hazard (in terms of irritation of contaminated skin, eyes, or mucous membranes). This product presents no significant flammability or reactivity hazards. Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

3. HAZARD IDENTIFICATION (Continued)

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The chief routes of overexposure to this product are via inhalation of mists or sprays generated by solutions of this product and contact with skin or eyes. The symptoms of overexposure, via route of entry, are as follows:

INHALATION: Inhalation of sprays, aerosols, or mists of solutions of this product may be irritating to the nose, throat and exposed mucous membranes. Symptoms of such exposure may include coughing, sneezing, and sore throat. Symptoms are generally alleviated when overexposure ends.

CONTACT WITH SKIN or EYES: Contact with skin may cause irritation and reddening of exposed tissue. The Organic Acid component of this solution is a potential allergen. Prolonged or repeated skin contact can lead to the development of allergy-like symptoms (e.g., dermatitis). Contact with eyes will lead to tearing, pain, reddening, and irritation.

SKIN ABSORPTION: Skin absorption is not anticipated to be a significant route of overexposure to this product.

INGESTION: Though not a likely route of occupational exposure, ingestion will lead to irritation of the throat, esophagus, and other tissues of the digestive system. Symptoms of such exposure would include coughing, nausea, vomiting, and diarrhea.



INJECTION: Injection of this product, via puncture with a contaminated object, will lead to a burning sensation, reddening, and swelling around the site of injection.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

ACUTE: Symptoms of short-term exposures would include pain, reddening, and irritation of exposed tissue. Severe inhalation or ingestion overexposure may be harmful.

CHRONIC: Prolonged or repeated over-exposures to this product via skin contact may lead to dermatitis and other allergy-like skin reactions. Refer to Section 11 (Toxicology Information) for further information on the components of this solution.

TARGET ORGANS: Skin and eyes.

| HAZARDOUS MATERIAL INFORMATION SYSTEM | | | |
|---|---------------|---|---------------|
| HEALTH | | (BLUE) | 1 |
| FLAMMABILITY | | (RED) | 0 |
| REACTIVITY | | (YELLOW) | 0 |
| PROTECTIVE EQUIPMENT | | | D |
| EYES | RESPIRATORY | HANDS | BODY |
|  | SEE SECTION 8 |  | SEE SECTION 8 |
| For routine fertilizer applications. | | | |

See Section 16 for Definition of Ratings

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

SKIN EXPOSURE: If the product contaminates the skin, decontaminate the affected area with running water. The minimum recommended flushing time is at least 15 minutes, especially if adverse skin reactions occur. If necessary, remove exposed or contaminated clothing, taking care not to contaminate eyes.

EYE EXPOSURE: If this product enters the eyes, open the contaminated individual's eyes while under gentle running water. Use sufficient force to open eyelids. Have the contaminated individual "roll" eyes. Minimum flushing is for 15 minutes.

INHALATION: If mists or sprays of this product are inhaled, remove the contaminated individual to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Victim should drink milk, egg whites, or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.

Contaminated individuals must be taken for medical attention if any adverse reaction occurs. Rescuers should be taken for medical attention, if necessary. Take a copy of the label and MSDS to physician or health professional with victim.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES

Foam: YES

Halon: YES

Carbon Dioxide: YES

Dry Chemical: YES

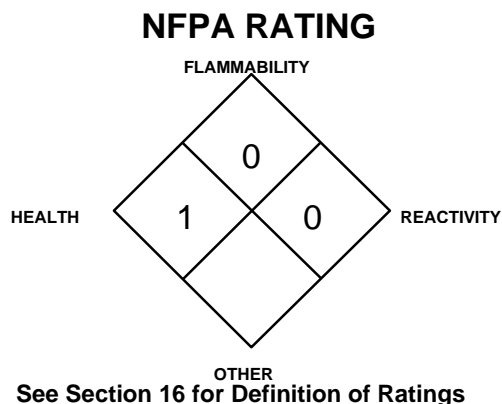
Other: Any "ABC" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire and exposed to extremely high temperatures, the components of this product will decompose to produce irritating vapors and toxic gases (e.g., phosphorous oxides, phosphine, sulfur oxides, carbon monoxide, ammonia, and carbon dioxide).

Explosion Sensitivity to Mechanical Impact: Not applicable.

Explosion Sensitivity to Static Discharge: Not applicable.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.



6. ACCIDENTAL RELEASE MEASURES

RELEASE RESPONSE: In case of a release, clear the affected area and protect people. Uncontrolled releases should be responded to by appropriately trained personnel in proper personal protective equipment, using pre-planned procedures.

In terms of small, incidental releases (e.g., torn or broken bags), the minimum personal protective equipment should be as follows: gloves, goggles, and appropriate body protection (e.g., boots, Tyvek suit). Absorb spilled liquid from solutions of this product with polypads or other suitable absorbent materials. Rinse area thoroughly with water. Decontaminate the area thoroughly. Place all spill residue in an appropriate container and seal. Reuse this product, or dispose of in accordance U.S. Federal, State, or local procedures and appropriate Canadian standards (see Section 13, Disposal Considerations).

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES -- NON-BULK CONTAINERS: All employees who handle this material should be trained to handle it safely. Open containers and drums slowly, on a stable surface. Open drum bungs carefully, to relieve any pressure build-up which may have developed during storage. All containers of this product must be properly labeled. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Keep container tightly closed when not in use. Inspect all incoming containers before storage to ensure that containers are properly labeled and are not damaged.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely, if necessary. Collect all rinsates and dispose of according to applicable U.S. Federal, State, or local procedures and appropriate Canadian standards (see Section 13, Disposal Considerations).

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to prevent inhalation of sprays or mists. All operations should be directed at minimizing the generation of aerosols, sprays, or mists. Eyewash stations/safety showers should be near areas where this product is used or sprayed.

RESPIRATORY PROTECTION: None required under normal circumstances of use. If operations generate aerosols, mists, or sprays which cause exposures in excess of the guidelines listed in Section 2 (Composition and Information on Ingredients), respiratory protection may be needed (e.g., air-purifying respirator with a high efficiency particulate filter) and must comply with the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the appropriate standards of Canada and its Provinces.

EYE PROTECTION: Splash goggles or safety glasses. Wear face shield for operations involving more than 5 gallons of this product in solution from which splashes or sprays can be generated.

HAND PROTECTION: Wear Neoprene gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS.

BODY PROTECTION: Use body protection appropriate for task (i.e. cover-alls, or rubber apron).

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): Not established

DENSITY: N/A

SOLUBILITY IN WATER: Completely soluble.

VAPOR PRESSURE, mm Hg @ 20°C (68°F): Not established.

ODOR THRESHOLD: Not established.

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not available.

APPEARANCE AND COLOR: This is a yellow, crystalline material with a faint to slight odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance and odor may act as distinguishing characteristics of this product.

EVAPORATION RATE (n-BuAc = 1): < 1.0

MELTING/FREEZING POINT: >230 °F

BOILING POINT: NA

pH: 10% Solution = 6.0

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: When exposed to extremely high temperatures, the components of this product will decompose to produce irritating vapors and toxic gases (e.g., phosphorous oxides, phosphine, sulfur oxides, carbon monoxide, ammonia, and carbon dioxide).

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong bases, strong oxidizers and strong reducers.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Exposure to extreme temperatures and incompatible materials.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The specific toxicology data available for components greater than 1% in concentration are as follows.

ORGANIC ACID SALT:

Skin-Rabbit, adult 500 mg/24 hours; Moderate irritation effects

Eye effects-Rabbit, adult 750 mg/24 hours; Severe irritation effects

Oral-Rat LD₅₀: 3 g/kg

Intraperitoneal-Rat LD₅₀: 883 mg/kg

Subcutaneous-Rat LD₅₀: 5500 mg/kg

Oral-Mouse LD₅₀: 5040 mg/kg

Intraperitoneal-Mouse LD₅₀: 903 mg/kg

Subcutaneous-Mouse LD₅₀: 2700 mg/kg

Intravenous-Mouse LD₅₀: 42 mg/kg

Oral-Rabbit, adult LDLo: 7000 mg/kg

Intravenous-Rabbit, adult LD₅₀: 330 mg/kg

PROPRIETARY POTASSIUM COMPOUNDS:

There are currently no toxicology data available for these components of the product.

PROPRIETARY SULFUR COMPOUNDS:

There are currently no toxicology data available for these components of the product.

PROPRIETARY IRON COMPOUND

There are currently no toxicology data available for this component of the product.

SUSPECTED CANCER AGENT: This product's components are not found on the following lists: U.S. FEDERAL OSHA Z LIST, NTP, IARC, and CAL/OSHA and therefore are neither considered to be nor suspected to be cancer-causing agents by these agencies

IRRITANCY OF PRODUCT: This product can be irritating to contaminated tissue upon prolonged or repeated exposure.

SENSITIZATION TO THE PRODUCT: The Organic Acid, which is a component of this product, is a potential skin sensitizer. Prolonged or repeated skin contact can result in the development of allergy-like skin reactions (e.g., dermatitis, rashes).

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: This product is not reported to cause mutagenic effects in humans.

Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.

Teratogenicity: This product is not reported to cause teratogenic effects in humans.

Reproductive Toxicity: This product is not reported to cause reproductive effects in humans. Clinical studies on test animals exposed to relatively high doses of the Organic Compound (a component of this product) provided reproductive toxicity data.

A *mutagen* is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An *embryotoxin* is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A *teratogen* is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A *reproductive toxin* is any substance which interferes in any way with the reproductive process.

ACGIH BIOLOGICAL EXPOSURE INDICES: Currently, there are no ACGIH Biological Exposure Indices (BEIs) associated with the components of this product.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Preexisting respiratory problems, dermatitis, and other skin disorders can be aggravated by exposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

12. ECOLOGICAL INFORMATION

WORK PRACTICES MUST PREVENT UNINTENTIONAL, ENVIRONMENTAL RELEASES.

ENVIRONMENTAL STABILITY: The components of this solution are relatively stable, but will decompose over time to generate other inorganic compounds. The following environmental data are available for the components of this product:

ORGANIC ACID: Water Solubility = 59.2% (20°C); 84% (100°C). Biological Oxygen Demand (BOD): 40%, 5 days; 60%, 10-20 days. The Organic Acid biodegrades quite rapidly. It is dangerous to aquatic life in high concentrations. Lowers pH in water but does not dissociate to any great extent.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This solution is irritating to contaminated animals. Refer to Section 11 (Toxicology Information) for information on this product's components and their effects on test animals. This product is a fertilizer. Releases of large quantities into an area can substantially alter the nutrient composition affect terrestrial plant life.

EFFECT OF CHEMICAL ON AQUATIC LIFE: This product is a fertilizer. Releases of large quantities into a body of water can substantially alter the nutrient composition affect aquatic plant and animal life. The following aquatic toxicity information is available for the components of this product.

ORGANIC ACID:

Food Chain Concentration Potential: Very Low

Aquatic TLm (immersion-shore crab) 48 hrs, salt water 160 ppm
(immersion-goldfish) 4 hr, fresh water 894 ppm killed

Waterfowl toxicity: No data available

TLm (immersion, shore crab) = 160 ppm/ 48 hours/ salt water

TLm (immersion, goldfish) = 894 ppm/ 4 hours/ fresh water/ killed

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or those of Canada and its Provinces. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

U.S. EPA WASTE NUMBER: Not applicable.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS NOT HAZARDOUS, PER 49 CFR 172.101, U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Not applicable.

HAZARD CLASS NUMBER and DESCRIPTION: Not applicable.

UN IDENTIFICATION NUMBER: Not applicable.

PACKING GROUP: Not applicable.

DOT LABEL(S) REQUIRED: Not applicable.

NORTH AMERICAN EMERGENCY RESPONSE GUIDE NUMBER - 1996: Not applicable.

MARINE POLLUTANT: No component of this product is listed as a DOT Marine Pollutant (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS NOT CONSIDERED AS DANGEROUS GOODS.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization, as follows.

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

U.S. STATE REGULATORY INFORMATION: Components of this product are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: No.

California - Permissible Exposure Limits for Chemical Contaminants: No.

Florida - Substance List: No.

Illinois - Toxic Substance List: No.

Kansas - Section 302/313 List: No.

Massachusetts - Substance List: No.

Michigan - Critical Materials Register: No.

Minnesota - List of Hazardous Substances: No.

Missouri - Employer Information/Toxic Substance List: No.

New Jersey - Right to Know Hazardous Substance List: No.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.

Pennsylvania - Hazardous Substance List: No.

Rhode Island - Hazardous Substance List: No.

Texas - Hazardous Substance List: No.

West Virginia - Hazardous Substance List: No.

Wisconsin - Toxic and Hazardous Substances: No.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): WARNING: This product contains traces of chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

ANSI LABELING (Z 129.1): **CAUTION!** MAY CAUSE SKIN, EYE AND RESPIRATORY SYSTEM IRRITATION. PROLONGED SKIN CONTACT MAY RESULT IN ALLERGIC REACTIONS. HARMFUL IF SWALLOWED. FOR AGRICULTURAL USE ONLY. KEEP AWAY FROM CHILDREN. Avoid contact with skin, eyes, and clothing. Avoid prolonged skin contact. Wash thoroughly after handling. Use in well-ventilated area. Use gloves, safety goggles, and appropriate body protection. **FIRST-AID:** In case of skin or eye contact, flush with copious amounts of water. Recommended flushing time is for 15 minutes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. If adverse reactions occur, get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂ or "alcohol" foam. **IN CASE OF SPILL:** Absorb with an inert material (i.e. polypads), then place in a suitable container. Consult Material Safety Data Sheet.

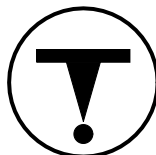
ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: The components of this product are on the DSL/NDSL Lists.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION AGENCY (CEPA) PRIORITIES SUBSTANCES LISTS: Not applicable

CANADIAN WHMIS SYMBOLS: **Class D2B:** Other Toxic Effects



16. OTHER INFORMATION

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Biagro Western Sales, Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Biagro Western Sales, Inc. assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order. **IDLH** - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG** - **MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]). Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure causes death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information:** **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. **Ecological Information:** **EC** is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **U.S.:** **EPA** is the U.S. Environmental Protection Agency. **DOT** is the U.S. Department of Transportation. **SARA** is the Superfund Amendments and Reauthorization Act. **TSCA** is the U.S. Toxic Substance Control Act. **CERCLA (or Superfund)** refers to the Comprehensive Environmental Response, Compensation, and Liability Act. Labeling is per the American National Standards Institute (**ANSI Z129.1**). **CANADA:** **CEPA** is the Canadian Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **TC** is Transport Canada. **DSL/NDSL** are the Canadian Domestic/Non-Domestic Substances Lists.